ABSTRACT OF THE DISCLOSURE

An ECU calculates the air-fuel ratio of each cylinder based on a sensor signal from an A/F sensor arranged at the collecting portion of the exhaust manifold and feedback controls the fuel injection quantity for each cylinder by using the individual cylinder air-fuel ratio obtained. A collecting portion fuel quantity is calculated from the air-fuel ratio at the exhaust collecting portion based on from the A/F sensor signal, and the gas flow rate at the exhaust collecting portion is calculated using the gas flow rate history of each cylinder. An observer using the individual cylinder fuel quantity as a variable is constructed by a model in which the collecting portion fuel quantity is associated with the individual cylinder fuel quantity, so that the individual cylinder fuel quantity is estimated from the result of observation by the observer. Each cylinder's air-fuel ratio is calculated from the estimated individual cylinder fuel quantity.